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A comparison of the effectiveness of gross motor rhythm imitation training and verbalised rhythm imitation training in developing rhythm imitation skills in pre-primary children

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A COMPARISON OF THE EFFECTIVENESS OF GROSS MOTOR RHYTHM IMITATION TRAINING AND VERBALISED RHYTHM IMITATION TRAINING IN DEVELOPING RHYTHM IMITATION SKILLS IN PRE-PRIMARY CHILDREN

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ABSTRACT

The purpose of this study was to compare the effectiveness of Gross-motor Rhythm Imitation Training and Verbalised Rhythm Imitation Training in developing rhythm imitation skills in pre-primary children.

Students of two pre-primary classes, with the same teacher, from a middle class metropolitan, co-educational government school were the participants in the research. One class was involved in the Gross-motor Rhythm Imitation Training Programme and the other in the Verbalised Rhythm Imitation Training Programme. The training programme was conducted four days a week for eight consecutive weeks. The researcher devised a 'Rhythm Imitation Test' which was conducted before and after the training period.

The results of this research show a significant difference in test scores between the two groups of students at the .004 level. The group of students involved in the Verbalised Rhythm Imitation Training Programme showed a significant improvement in test scores between the pre-test and post-test at the .000 level, while group of students involved in the Gross-motor Rhythm Imitation Training Programme showed no significant improvement in test scores.

These results have implications for both music educators and pre-primary teachers who are interested in improving pre-primary childrens' rhythm skills and in particular the verbal rather than the gross-motor method by which these rhythm imitation skills are learned. The results of this report question some of the common rhythm learning practices. They also point to far reaching implications in the way rhythm imitation skills can be taught in pre-primary years in order to optimise children's rhythmic ability.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

(i) incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education;

(ii) contain any material previously published or written by another person except where due reference is made in the text; or

(iii) contain any defamatory material.

Signature.

Date..23/7/97

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CHAPTER ONE

INTRODUCTION

This study compares the effectiveness of two rhythm imitation training programmes undertaken by Pre-Primary students in a selected government school. The following chapter will provide a background to the study; the purpose and significance of the study; the delimitations of the study; and the research hypotheses that provided the focus for the research.

Background to the study

Thackray (1972, p. 67) stated that "the complexity of rhythmic abilities demands many forms of rhythmic training and a wide variety of rhythmic exercises and activities which could be applied to both class and individual teaching". To quote Woolcock (1990, p. 6), "Gardner (1971) concluded that the development of skill in imitating rhythm patterns is important in a musical context and is an important aspect of developing aural awareness, which in turn is important in the development of skills in motor response, rhythm reading, organisation and recollection of (music) information, and the appreciation of music".

An examination of rhythm training in music reveals that the methodologies of Orff, Kodaly, Gordon, Dalcroze and the Yamaha teaching

method use activities such as exploration, imitation, improvisation, gross motor movement and creativity to develop rhythm skills (Ashley, 1986). These educators and methods consider, that with young children, small progressions of rhythm learning are desirable due to the limited gross motor and fine motor skills of young children (Costanza and Russell, 1992). Mursell (1931), as quoted in Campbell (1991, p.19), declared that " all rhythm is a motor experience and that the bodily swing is the way in which rhythm is sensed . . . They should be large muscular responses". Walking, running, marching, clapping and other such gross motor movements are used to establish the beat and experience rhythm. (Hedden and Woods, 1992).

Children also imitate rhythm by clapping simple patterns using minims (half notes), crotchets (quarter notes) and quavers (eighth notes). Pascoe (1995) found that over 90% of the 455 Western Australian high school students who participated in her study had learnt to clap rhythms at primary school.

This practice of clapping for rhythm learning is not favoured in the findings of Gardner (1971), Greenberg (1976), Rainbow and Owen (1979), Rainbow (1981) and Schleuter and Schleuter (1985) who all concluded that verbal chanting was the easiest and most accurate response for children aged three to six, followed by clapping after vocalising, clapping a steady beat, then tapping a steady beat with an object. According to these authors, gross motor activities such as echo clapping, walking and marching to the beat were found to

be more difficult activities for young children but easier and more accurate for older children. Thackray (1972, p.67) also states that "in general large bodily movements are probably less effective as a means of rhythmic training than smaller movements".

Since young children find tasks requiring gross-motor co-ordination particularly difficult, verbalisation seems to be a more appropriate method of rhythm imitation training. French time names and other syllabic systems have been used in conjunction with echo clapping in rhythm training. However, they are primarily used for improving rhythm literacy and not for the specific purpose of rhythm imitation (Colley, 1987). As different time names are given for each note value, children have to contend with remembering the combination of note value names rather than focusing on the sound only of rhythm itself (Colley, 1987). For the purposes of this study the researcher chose to use one syllable 'tun' to verbalise any rhythm pattern to eliminate such problems.

Purpose of the study

The purpose of this study was to compare the effectiveness of two different rhythm imitation training programmes in developing children's rhythm imitation skills. Specifically, it aimed to measure improvements in rhythm imitation skills as they occurred in the two groups of participants made up of pre-primary children. By comparing the pre-test and post-test results of each of

the groups involved, it was possible to assess the degree to which the training had been effective in achieving its objectives.

Significance of the study

At present, there is little research dealing with rhythm imitation. It appears that no previous study into the effectiveness of verbalised rhythm imitation training has been conducted nor is there one comparing the effectiveness of verbalised rhythm imitation training with gross motor movement rhythm imitation training. If the results of this study can provide meaningful answers as to how teachers can take action to increase rhythm imitation skills in pre-primary aged children, it will open up hitherto new and untried methods of enhancing, facilitating and developing rhythm training with children. Furthermore, the findings from this study may provide a focus for further research into rhythm imitation skills and, in particular, training methods that can influence the acquisition and development of such skills.

Research Hypothesis

The following hypothesis is to be tested:

The students involved in the Verbalised Rhythm Imitation Training Programme will show greater improvements in their ability to imitate rhythms than the students involved in the Gross-Motor Rhythm Imitation Training Programme.

Research Questions

Research questions that will be addressed are:

1. Is there a significant improvement between the pre-test and post-test scores of students who engage in a Verbalised Rhythm Imitation Programme?
2. Is there a significant improvement between the pre-test and post-test scores of students who engage in a Gross Motor Rhythm Imitation Programme?
3. Is there a significant difference in test scores between students who engage in a Verbalised Rhythm Imitation Programme and students who engage in a Gross Motor Rhythm Imitation Programme?
4. Is there any significant difference in the test scores of males and females who engage in a Verbalised Rhythm Imitation Programme or a Gross Motor Rhythm Imitation Programme?

Definitions

Verbalised Rhythm Imitation Programme (VRIP): This programme consists of simple rhythm patterns using minims (half notes), crotchets (quarter notes) and quavers (eighth notes) presented verbally by the researcher on a tape using only one syllable "tun". The rhythms will be verbally repeated by the class teacher and then imitated by the students.

Gross Motor Rhythm Imitation Programme (GMRIP): This programme consists of the same simple rhythm patterns above. Rhythms clapped by the researcher on tape will in turn be clapped by the class teacher and then imitated by the students. No verbal sounds will accompany the clapping.

Gross Motor Skills: Gross motor activities require large muscle control. Activities are nonmanipulative and develop control of the body. Walking, rolling, jumping, galloping, skipping, swinging, hanging, gripping and twisting are all examples of gross motor activities (Wall and Murray, 1990). Clapping is nonmanipulative and involves control of the arms. For the purposes of this study, clapping is considered to be a gross motor activity.

Delimitations of the study

The following factors fixed the boundaries for this study:

* only one school was used in the study;
* only Pre-Primary students were included in the study;
* only one teacher with no formal music training was involved in the training programme;
* the selected classes consisted of white middle-class Australian children;
* a school with two groups of pre-primary students attending part-time; and same teacher was chosen in order to limit the numbers of variables

affecting the results.

Structure of thesis

Following this introduction to the study, Chapter Two provides an overview of research relating to rhythm ability, motor skills and rhythm learning, verbalisation of rhythm patterns, the ability to duplicate rhythms and rhythm imitation training. These studies are more concerned with rhythmic ability and age-related rhythm responses than with effectiveness of rhythm imitation training.

Chapter Three outlines the theoretical underpinnings of the study which incorporate Piaget's and Vygotsky's theories of learning as well as processes of instruction and imitation.

Chapter Four details the procedure and findings of the pilot study, the main purpose of which was to assess the suitability of the researcher's rhythm imitation test, adapted from Woolcock's Rhythm Imitation Test.

Chapter Five outlines the methodology and collection of data. This chapter also includes the design, setting and sample, instrument, procedure, data calculations and ethical considerations of the study.

In Chapter Six, the research hypotheses are answered and the findings of the research are recorded and analysed. Tables showing the results of Group A and Group B for the pre-test and post-test are given as well as the results of two-tailed t-tests conducted. Tables showing the results of a three-way ANOVA with repeated measures on the factor of time are also given in this chapter.

Chapter Seven reports a discussion of the main findings of this study in which the Verbalised Rhythm Imitation Training Programme shows significant improvement between the pre-test and post-test scores of pre-primary students after a training period of only eight weeks.

The final chapter draws some conclusions from the results and findings of this study and discusses some implications of rhythm imitation ability and training for pre-primary children with recommendations for future research.

CHAPTER TWO

LITERATURE REVIEW

Research studies from 1970 to the present time, focusing on rhythm ability, rhythm training and imitation ability of young children, are reviewed in this chapter. Also briefly outlined are studies which provide background information about rhythm performance and learning which are relevant to this study.

Rhythm Ability

Most of the research investigating rhythm has focussed on rhythmic ability and age-related responses to rhythm. Thackray (1969, p.45) in his study into rhythmic abilities found that " although rhythmic ability is complex, there is a common factor running through all forms of rhythmic activity, which might be defined as the ability to perceive rhythmic structures in respect of the three elements of timing, duration and intensity, and to perform rhythmic movements in which these qualities are clearly defined".

Authorities disagree regarding the extent to which rhythmic abilities can be improved by training. Seashore (1938) found that a 'sense of rhythm' is a fairly fixed constant that does not change significantly with age, practice or training. Thackray (1972, p. 78) Swindle (1913), Henderson (1931) and Coffman (1951), concluded that training has some effect. Seashore (1938) goes on to

explain that the ear-hand co-ordination may improve, as expected in terms of maturation, but this does not mean that the perception of the rhythm has improved.

Most rhythmic ability tests are based on the degree to which a child can accurately respond to rhythm in a physical manner or accurately discern differences in the rhythms heard. Thackray (1972, p.54) found "the factor of general music ability was revealed more clearly by the performance tests than by those of perception". Lundin (1967) quoted in Thackray (1969, p.44) stated that "it is difficult to isolate the discriminative from the motor aspects of the response . . . for rhythm is both a perceptual and a motor response . . . and in the actual performance of a rhythm a perception of the pattern must occur". Thackray (1969, p.44) challenges this statement suggesting that " if perception must occur in the performance of a rhythm, we should expect subjects who do well in a performance test to do well also in a test of perception. Although our results have shown that this is more often the case, the exceptions are sufficiently common to suggest that Ludin's statement cannot be accepted without question". He goes on to explain that a performance of rhythm may be done spontaneously, without conscious effort or thought. Perhaps this is a natural progression of rhythm learning or training. In his suggestions for further research, Thackray (1972, p.82) suggests "there is scope for more work on the effectiveness of various forms of rhythm training".

Motor Skills and Rhythm Learning

Sidnell (1981) quoted in Scott-Kassner (1992, p. 639) stated that "although music educators have assumed that motor learning is a means to the end of rhythmic achievement, little enquiry into that assumption exists".

The studies reviewed in this section all used motor skills to demonstrate an understanding and perception of what was heard. Since pre-primary children find tasks involving gross motor co-ordination difficult, verbalisation seems to be a more appropriate rhythmic response for children to give (Davidson and Colley, 1987, p. 109).

Foley (1975) explained that rhythm imitation by clapping was useful as a feedback mechanism for rhythm conservation and listening skills. Miller (1987, p. 220) stated that " Gilbert's (1980) research suggests the need to design specific motor music skills according to the chronological age of children. In view of her findings, music educators should devise motor tasks that incorporate abilities in perceptual and cognitive areas and those upon which later learning can be built".

Verbalising Rhythm Patterns

Schleuter and Schleuter (1985), Rainbow (1981) and Frega (1979) all found that verbalised chanting of rhythms was the easiest method of response for

young children. Conversely, echo clapping, walking and marching were found to be the most difficult. Schleuter and Schleuter (1985, p. 29) stated that "the ability to produce accurate physical responses to rhythm patterns appears to be influenced by maturation, with large muscle movements more difficult than smaller muscle movements".

While Greenberg (1976) felt that young children have the potential to develop skills such as clapping rhythmic patterns through imitation, he also concluded that vocalised musical behaviour (such as singing training) in young children exceeded their ability to learn to play an instrument because of their limited gross and fine motor development. This possibly also applied to children's ability to echo clap accurately.

Gordon (1993, p. 309) stated that "when a child has developed . . . a vocabulary of tonal patterns and a vocabulary of rhythm patterns to the extent that he can sing with acceptable intonation . . . and can chant with consistent tempo patterns in usual duple and triple meters, he is ready to begin the study of an instument". Although Gordan has worked extensively in rhythm and tonal work, his work does not include work related to vocal rhythm imitation training for pre-primary children.

In his study of the transfer of rhythm skills in instrumental music, Pierce (1992) suggested that children take less time to transfer musical knowledge when learning procedures emulate performance behaviour. The clapping of rhythm is

most unlike the overt behaviours involved in instrumental performance. Pierce (1992, p. 303) states " it seems reasonable to suggest that the sizzle learning procedure, which incorporated physical movements most closely associated with actual wind instrument performance (blowing air between the teeth creating a sizzle sound articulated with the tongue) emulated actual performance behaviour".

It seems likely then, in the case of wind instrument playing, that children could easily transfer verbalisation of rhythms to techniques such as 'sizzling' rather than transferring clapping of rhythms to 'sizzling'.

The Ability to Duplicate Rhythms

Studies available in this area are those of Stambak (1951) and Gardner (1971). Stambak administered twenty-one rhythm patterns of three to eight blows (taps) to participants ranging from six to twelve years old. Patterns were administered in order of difficulty and a ratio of 4:1 long to short beats was used. Stambak examined the mean number of blows the children could imitate and found that six year olds could only imitate three to four blows, five by the seven to eight year olds and seven to eight blows by the twelve year olds.

A lack of detail in Stambak's articles prompted Gardner to validate Stambak's findings. Sixty participants took part in the study. Twenty participants

each of six, eight and twelve year olds heard twenty items ranging from four to eight taps in random order. The participants then duplicated the patterns by hitting a pencil on a wooden surface. The findings were similar to Stambak's and essentially validated his conclusions.

Gardner, however, found that some six year olds performed as well as the twelve year olds whilst some could barely handle the simplest items. He concluded that children of different ages could successfully execute pattern-duplicating tasks and that their performances could be judged without resorting to complex mensural tasks.

Both studies required gross motor movement responses to the patterns heard and a lack of such skills in young children could have accounted for the relatively poor responses from them. Neither study dealt in any way with pattern-duplicating or imitation training or the effect that training may have had on the maturation effect of rhythm imitation.

Rhythm Imitation Training

Only one study by Woolcock (1990) deals with the training of rhythm imitation skills. The study looked at pitch and rhythm training. Woolcock compared four groups of pre-primary students, two of which undertook a training programme and the other two acted as control groups. Two groups

participated in pre-tests and post-tests whilst the other two participated in the post-tests only.

Woolcock found no significant improvements in the performance of any of the groups but acknowledged that the physical act of tapping out the rhythm on one key of a keyboard was very difficult to co-ordinate which possibly affected the results. Another possible reason for no improvement was that the training only took place once a week for a few minutes. More frequent training sessions may have been required to give a more accurate result. The examples used for training were not given nor was the tempo of the examples indicated.

Shuter-Dyson and Gabriel (1981) quoted in Hargreaves (1986, p. 101) concluded that " specific coaching can indeed improve specific skills in many cases. Rhythmic tests, for some reason, seem to be more resistant to the effects of music lessons than most others". Zimmerman (1971) also concluded that "rhythmic pattern responses are less influenced by training than pitch responses". Perhaps the sole use of gross motor responses in rhythmic imitation training and assessment may have contributed to this resistance.

Summary

Literature on the topic of rhythm imitation training is largely unavailable. Furthermore, that which is available is limited in providing specific details of the rhythm training programme used, the amount of time spent each week in

rhythm imitation training and whether or not the same examples were used in all groups. Researchers in rhythm imitation training programmes are aware that children are unable to imitate the rhythm examples given because of poor motor control rather than a lack of rhythmic perception or ability. Verbalising rhythm patterns appears to be the easiest method of response for young children with clapping being possibly the most difficult. Researchers conducting studies on the ability to imitate rhythms do not seem to consider the tempo at which the rhythms are performed and the length of the rhythm patterns to be imitated. There appears to be a need for more rigorous research into the rhythmic abilities of pre-primary children with respect to effective rhythm imitation training programmes.

CHAPTER THREE

THEORETICAL FRAMEWORK

The theoretical underpinnings for this study incorporate Piaget's (1970) and Vygotsky's (1986) theories of development as well as processes of instruction and imitation.

The majority of research that assesses children's understanding of rhythmic concepts are based on Piaget's principle of conservation. One such study is Pflederer (1964). However, Davidson and Colley (1987) concluded that:

> It is difficult to ascertain a clear picture of rhythmic-cognitive development from the body of Piagetian literature. What is needed to supplement the Piagetian-based literature, are studies that measure rhythmic understanding in a variety of psychomotor contexts - perception, description, performer and notation. (p.110)

Piaget has, nonetheless, made a valuable contribution to learning and development theory. To quote Zimmerman (1971, p. 15):

> The research of Jean Piaget presents a graphic description of how children build a conceptual frame work that enables them to interpret their surroundings. Piaget developed an elegant and highly sophisticated theory of growth and development of human intelligence. Piaget views this development as moving in stages from activity without thought through thoughtful activity to conceptualisation.

Vygotsky (1986) took this thought a little further. He felt that children could progress beyond their level of mental development but only with assistance from a teacher who pitched materials at a level just beyond the student's present mental development - the zone of proximal development.

Vygotsky (1986) stated that:

> The discrepancy between a child's actual mental age and the level he reaches in solving problems with assistance indicates the zone of his proximal development. With assistance, every child can do more than he can by himself - though only within the limits set by the state of his development. (p.187)

According to Vygotsky (1986, p. 184), " instruction usually precedes development. The child acquires certain habits and skills in a given area before he learns to apply them consciously and deliberately". Thus, imitation in this context is no longer considered a mechanical activity by psychologists. Vygotsky (1986, p. 187) stated " the child is most successful in solving problems that are closer to those solved independently; then the difficulties grow until, at a certain level of complexity, the child fails, whatever assistance is provided". He concluded that imitation in learning new skills can play a major role in leading the child to new developmental levels, so long as these new skills and materials are placed only just beyond his mental development in his zone of proximal development (Vygotsky, 1986).

As the exercises in this study have been carefully graded, i.e. moving from problems children can solve independently to problems within and just beyond their proximal development, it is hoped that this research will underscore Vygotsky's theory.

CHAPTER FOUR

PILOT STUDY

In the initial stages of the research, a pilot study was conducted. Its main purpose was to assess the suitability of the rhythm imitation test devised by the researcher, which was to be used in the main study.

Twenty students were selected from a pre-primary class at Kinross Pre-Primary Centre. Ten female and ten male subjects were selected by the teacher. All the students had attended the centre for almost three terms. None of the students had any prior formal music training. The students were randomly divided, by writing their names on pieces of paper which were then put into a container and drawn out one at a time, into two mixed groups of ten each.

The test required the students to imitate ten rhythms heard on tape recorder by clapping or vocalising using the syllable 'tun'. One group of ten students used clapping as a means of imitation while the other group verbalised the rhythm pattern using the syllable 'tun'. All rhythms were played at the MM crotchet/quarter note = 114 beats per minute. The first rhythm example in the test was the shortest and the simplest. Two factors were considered when ordering the test items. Firstly, the questions were ordered according to the length of the example, ie., three crotchet/quarter note beat examples were first followed by four beat examples and lastly seven beat examples. Secondly, the items were

ordered by the difficulty of the varying rhythm patterns. Thus difficult rhythm patterns contained a greater proportion of crotchet/quarter note and quaver/eighth note combinations. The length of the examples ranged from three crotchet/quarter note beats to seven crotchet/quarter note beats. These decisions were based on the findings of both Stambak (1951) and Gardner (1971). Each student response was recorded on audio-cassette.

The following tables indicate the number of crotchet/quarter note beats correctly imitated for each item. One point was given for each beat correctly imitated irrespective of where that particular beat lay in the example. For example, if the test item consisted of three crotchet/quarter note beats and the first beat was imitated incorrectly while the second and third beats were imitated correctly, the score for the item would be two points out of a possible three points. For the item to be assessed as correct, the whole rhythm pattern of each individual beat, ie two quaver/eighth notes = one crotchet/quarter note beat, had to be imitated correctly at the same tempo as the test item.

Table 1 : Number of crotchet/quarter note beats correctly imitated in the Rhythm Imitation Test, Group A (verbal response), pilot study. (*N = 10)

Item	Total number of beats	Number of beats correct	Percentage of beats correct
1	30	27	90%
2	30	30	100%
3	30	27	90%
4	40	40	100%
5	70	59	84%
6	70	18	25%
7	70	59	84%
8	70	14	20%
9	70	37	53%
10	70	42	60%

* N = number of participants.

Table II : Number of crotchet/quarter note beats correctly imitated in the Rhythm Imitation Test, Group B (gross-motor response), pilot study.(*N = 10)

Item	Total number of beats	Number of beats correct	Percentage of beats correct
1	30	24	80%
2	30	24	80%
3	30	21	70%
4	40	28	70%
5	70	59	84%
6	70	16	23%
7	70	27	38%
8	70	21	30%
9	70	29	41%
10	70	38	54%

* N = number of participants.

The following tables III and IV indicate the number of students who obtained a correct response for each item. Items were scored as 'correct' or 'incorrect'. A correct response was one where the rhythm pattern was imitated by clapping or verbalising correctly at the same speed as the test item. Even if a small portion was incorrectly imitated or the speed varied a little from the test item, the response was scored as incorrect.

Table III : Number of correct responses in Rhythm Imitation Test, Group A (verbal response), pilot study,(*N = 10).

Item	Number of correct responses	Percentage of correct responses
1	9	90%
2	10	100%
3	8	80%
4	10	100%
5	5	50%
6	2	20%
7	8	80%
8	2	20%
9	1	10%
10	3	30%

* N = number of participants

Table IV : Number of correct responses in Rhythm Imitation Test, Group B (gross-motor response), pilot study. (*N = 10).

Item	Number of correct responses	Percentage of correct responses
1	8	80%
2	7	70%
3	4	40%
4	5	50%
5	4	40%
6	2	20%
7	1	10%
8	1	10%
9	0	0%
10	1	10%

* N = number of participants

The main purposes of the pilot study were to assess the effectiveness of the items in the test and testing procedure including the effectiveness of the testing and method of analysis.

Effectiveness of items in the test was judged by the number of students who gave correct responses to the test items, as detailed in table III and IV. Items which showed a high number of correct responses were considered ineffective as no room was left to show an improvement in the student's ability to imitate rhythm patterns after a period of rhythm imitation training. Table III indicated that a ceiling effect could possibly occur with test items 1,2,3,4 and 7 as most of the 'verbal' group of children responded correctly. Although only items 1 and 2 in table IV (gross-motor) showed a high correct response rate, the researcher decided to delete items 1,2,3,4 and 7, in order to avoid a ceiling effect and allow for greater improvement in the verbal test results. Thus more complex examples were included in the rhythm imitation test for the main study.

When conducting the test, all children were able to respond to the practice examples correctly and all understood what was expected of them from listening to the instructions on the tape (see Appendix Five, p.62.). Some of the children appeared apprehensive about responding in the presence of the researcher. This was eliminated to a degree in the main study by having the researcher visit the students in the classroom on a casual basis before the testing took place.

Effectiveness of testing and analysis was gauged by comparing the two different methods of scoring the test items. Tables I and II show results of items in terms of how many beats were correctly imitated. Tables III and IV show results of items in terms of students who were able to imitate the whole example correctly. After comparing the two sets of tables it became apparent that perhaps a false impression of the overall accuracy and ability of the students was presented in tables I and II. For example, in table II, item 5 shows a total of 59 crotchet/quarter note beats scored correctly out of a possible 70, which was a percentage of 84%. However, in table IV, only four students (40%) responded correctly to item 5. Therefore it was decided that scoring student responses as "correct" or "incorrect" as for tables III and IV was seen as a more effective and accurate way of reporting the results of the test for the main study.

In the test, both groups had some difficulty with the longer rhythms, i.e. the seven beat rhythm patterns of items 5 - 10. It was decided that these longer rhythms would remain in the test to measure the effectiveness of the training programme. It also gave children greater scope for improvement. The researcher acknowledged that this made the rhythm imitation test significantly more difficult for those students in the gross-motor training group.The researcher decided to use item 1 of Woolcock's Rhythm Imitation Test and item 1 of the pilot study test as practice examples for the main study as all but one student was able to imitate these examples correctly.

CHAPTER FIVE

METHODOLOGY

Design

This research focussed on a single variable. The variable was the method of instruction used - verbalised rhythm imitation versus gross motor imitation. It adopted a pretest-posttest control group design as described in Busch and Sherbon (1992). The experimental group received verbalised rhythm imitation training whilst the control group received the more traditional gross-motor imitation training. Only one teacher was involved in the study. The teacher had no formal music training but had some basic music knowledge and showed no preference for either method of rhythm imitation. As the classes and students already existed and were not chosen at random the design is considered to be quasi-experimental.

According to Woolcock (1990, p.52), "the effects of history are such that events between the pre-test and post-test (in addition to the experimental variable) could produce effects which are confounded with the effect of the experimental stimulus". Campbell and Stanley (1966) quoted in Busch and Sherbon (1992, p.126) stated that " *history*, the major weakness of the time-series quasi-experiment, is controlled by presenting the treatment on numerous separate

occasions, rendering extremely unlikely any rival explanation based on the coincidence of extraneous events".

Although the testing took place ten weeks apart, the venue for the pre-test and post-test was the same. Testing took place in the morning, one week before the commencement of the training programme. In addition the treatment or training programme was conducted four days a week for eight consecutive weeks. Each group received rhythm imitation training sessions in the morning on two days of the week and in the afternoon on the other two days. Because of the frequency of the treatment and the fact that each group received the same number of training sessions in the morning and in the afternoon, it is unlikely that the results could be due to coincidence or any other extraneous events.

The effects of testing also needed to be considered. There was a need to ensure that improvement or deterioration in the post-test was not due to the student having experienced the test previously. It is unlikely that this occurred, considering the age of the children, the ten week gap between tests and the measures taken to ensure that the students understood and practised what was required before sitting the test.

Also test instruments needed to be controlled for changes in the measuring instrument. Since the same instrument was used for both the pre-test and post-test there was no deterioration in the instruments used between the pre-test and post-test. There was, therefore, no instrumentation effect.

Setting and Sample

The setting for this study was Kinross Pre-Primary Centre in Kinross, a middle class northern suburb of Perth, Western Australia. Two classes of approximately twenty pre-primary students who attended the centre for two mornings and two afternoons per week participated in the study. The students were not the same ones that participated in the pilot study. The students aged from 4.5 - 5.5 years had attended three terms at the pre-primary centre and had not had any formal music training or participated in classroom music activities involving rhythm imitation. Group a consisted of twenty-one pre-primary children who participated in the Verbalised Rhythm Imitation Programme and Group B consisted of nineteen pre-primary children who participated in the Gross Motor Rhythm Imitation Programme.

Only one pre-primary teacher was involved in the study. The teacher did not have any formal music training but had sufficient knowledge of music to follow the instructions given by the researcher. She had no preference for either

method of rhythm imitation, i.e. gross-motor or verbal. The pre-primary teacher conducted the training programmes after instruction from the researcher. This consisted of three sessions of approximately an hour over a period of two weeks. Furthermore, regular checks, both by observation and discussion, were made by the researcher in order to assess the extent to which the programmes were being followed.

Pilot Instrument

The researcher used an adaptation of Woolcock's Rhythm Performance Test (see Appendix Three, p. 60) for both the pre-test and post-test. Woolcock's test involved students listening to ten items, on a tape and tapping a response on a keyboard. Although the pilot study of Woolcock's Rhythm Performance Test indicated a couple of possible design faults; such as a possible ceiling effect on items 1 and 3, and an inability of participants to co-ordinate the response in tapping on the keyboard due to poor motor co-ordination skills, Woolcock made no changes to the test for her main study. As there is no reason given in Woolcock's study for this, one can only surmise that she considered these made no difference to the overall results.

Woolcock (1992) found in the pilot study that the students had difficulty imitating the rhythm due to three factors:

(1) a lack of familiarity with the activity,

(2) difficulty in following instructions given by the researcher.

(3) an inability to co-ordinate the response on the keyboard.

These problems were addressed by the researcher in the following manner:

* allowing a five minute practice session before the test to assist with familiarity of the activity;
* using participants who have had at least six months experience in a school environment of following verbal instructions; and
* verbalising or clapping the response instead of tapping the response on a keyboard.

In Woolcock's pilot study, the first test item was answered correctly by all but one of the eight participants. Therefore it was not surprising to find no significant improvement between the pre-test and post-test in Woolcock's main study. A similar result was found for question three. As neither of these items gave room for improvement due to a ceiling effect, there seemed little reason for their inclusion in the test for this study. She considered both items as good practice items for the final test. Woolcock's main test contained items consisting of three to seven beats in accordance with the findings of Stambak (1951) and

Gardner (1971). For this study, the researcher modified Woolcock's rhythm test with the inclusion of two new items (see Appendix Two, items 1and 3). Because of this, the researcher felt it was necessary to conduct a pilot study to ensure the new items were worth including. The pilot study was also conducted at Kinross Pre-Primary Centre with a group of children of the same age from a class other than those chosen for the main study.

Final Instrument

From the results of the pilot study conducted at Kinross Primary School, a number of changes were made to the researcher's modified version of Woolcock's test. Items 1,2,3,4 and 7 were deleted from the test due to a possible ceiling effect by the 'verbal' group of children and five more difficult questions were included in the final test. Only five of the ten items in Woolcock's Rhythm Test were included in the final test for this study. Items 5,7,8,9 and 10 were included, though arranged in a different order by the researcher, as neither Woolcock's pilot study or the researcher's pilot study showed a possible ceiling effect for these items. The items complemented the other five devised by the researcher, providing challenges for both groups concerned.

The tempo of Woolcock's Rhythm Performance Test is MM crotchet/quarter note = 80. Whether this tempo was used for the training programme is not indicated in the literature. Scott-Kassner's (1992) review of

research on music in early childhood found two studies by Vaughan (1981) and Walters (1986) which examined the preferred tempi of children. The mean tempo of pre-primary children was found to be approximately MM crotchet/quarter note = 114-118. Scott-Kassner (1992), commented that "Walters found that children of all ages had more difficulty the greater the divergence from their personal tempo"(p. 640). Frega (1979) also found that slower tempos were the most difficult for young children. Kuhn-Gates (1975) found that the tempo increased during the performance of the musical example. This could be attributed to the fact that a tempo of MM crotchet/quarter note = 90 was used which is significantly slower than a young child's preferred tempo. This might have caused the child to increase the tempo of the musical example in line with his/her personal tempo. Zimmerman (1971) quoted in Peery et al. (1987, p. 210) stated that "music with fast tempi should be used first in rhythmic movement experiences. Slower tempi can be gradually inserted as the child becomes more adept in synchronising movement with music". Given this information both the training tempo and the test tempo were taken at MM crotchet/quarter note = 114. This was monitored at all times by the use of an electronic (flash) metronome.

Procedure

The pre-test was conducted by the researcher in week One of the school term and the post-test in week Ten of the school term. During the eight weeks between the tests the children participated in one of two training programmes, using the same rhythmic examples, devised by the researcher (see Appendix Six, p. 63). Daily, ten taped simple rhythms of graded difficulty were played to the students by the pre-primary teacher. The teacher imitated the rhythm first followed by the children. Pierce (1992, p. 296) stated that the "results of skill acquisition studies suggest that modelling is the most effective method of learning within the constraints of brief time limits".

Eighty rhythm combinations in all were devised by the researcher. A different set of ten rhythms was heard and imitated each day until the eighty rhythms had been presented. The examples used in the Rhythm Imitation Test were not included in the training programme. This procedure took eight days, which was two school weeks for the pre-primary children. The tape was then rewound and started again. Over the eight week training period the tape containing 80 items was heard four times. Each group attended for two mornings and two afternoons a week so the training took place four days a week for eight weeks. Group A was involved in the Verbal Rhythm Imitation Programme and Group B in the Gross Motor Rhythm Imitation Programme.

Data Calculations

The pre-test and post-test was conducted individually by the researcher with the participant's responses taped for analysis by the researcher. Each performance was graded as 'correct' or 'incorrect' with one point being awarded for a correct response (see Appendices Seven and Eight, p.67). Tables are shown in Chapter Six, page 37.

The means of the pre-test and post-test scores for each group were analysed using the two tailed t-test. The tables were then discussed by the researcher. Any other relevant observations made by the researcher were noted e.g. the rhythm was imitated slower than the given example or faster than the given example.

To determine whether there was a significant difference in scores between the groups, the data were analysed using a 3-way ANOVA with repeated measures on the factor of time to:

a) compare the pre-test and post-test scores of group A and B;

b) compare the pre-test and post-test scores of the participants within each of the groups;

c) compare the pre-test and post-test scores of males and females in each group.

Ethical considerations

It was important to identify and address any ethical concerns associated with this study. Participants were treated with respect and dignity at all times. Participation in the study was voluntary. Prior to the study being conducted, informed consent was sought from the principal, teacher and parents of students attending Kinross Pre-Primary Centre (see Appendix Four, p. 61). Anonymity of the children was safeguarded by the following procedure:

(1) Children were assigned a number at random by the class teacher,

(2) The researcher only knew the child by number and not by name, and

(3) The individual results of the children were not seen or discussed with the class teacher.

CHAPTER SIX

RESULTS OF THE STUDY

In this chapter, the results are recorded of both the pre-test and post-test for each individual as well as each group. Both tables and graphs are used.

Verbalised Rhythm Imitation Training Results

Table V records the number of correct responses by students in the Verbal Rhythm Imitation Training Group for each item in the pre-test and post-test. Raw scores and percentages have been recorded.

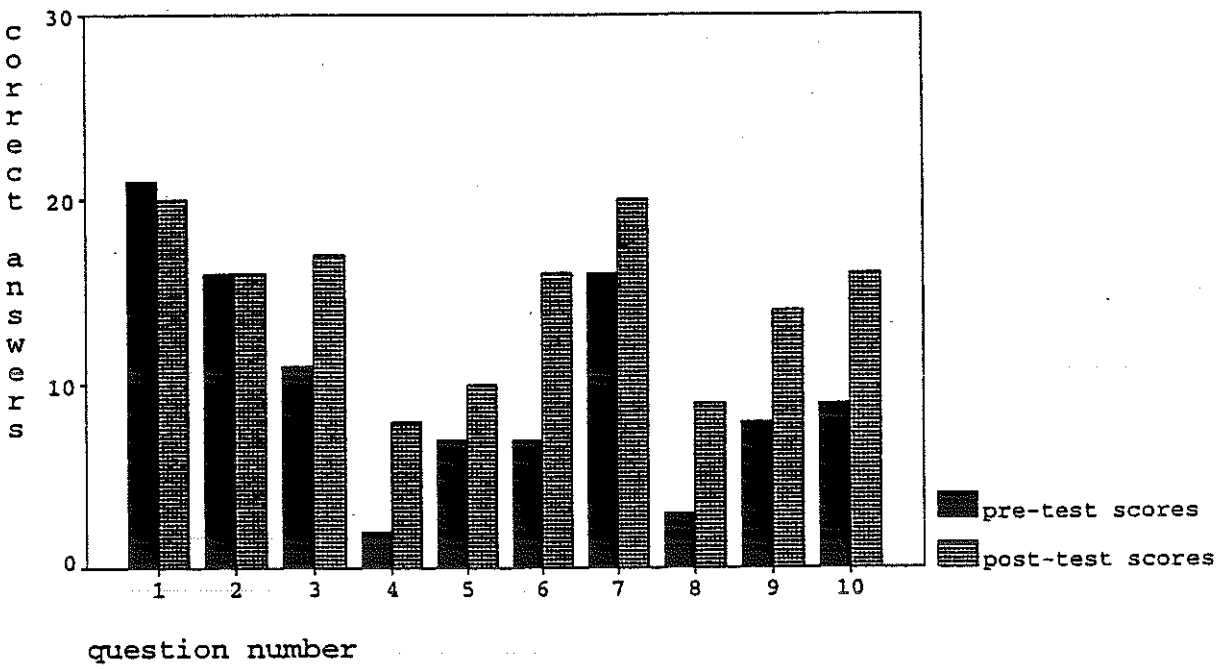
Table V - Number of correct responses by students in Group A. (Verbal)

Item No.	*Pre-test score* **n = 21*	*Percentage of responses correct*	*Post-test score* **n = 21*	*Percentage of responses correct*
1	21	100 %	20	95 %
2	16	76 %	16	76 %
3	11	52 %	17	81 %
4	2	9.5 %	8	38 %
5	7	33 %	10	48 %
6	7	33 %	16	76 %
7	16	76 %	20	95 %
8	3	14 %	9	43 %
9	8	38 %	14	67 %
10	9	43 %	16	76 %

** n = number of participants*

Figure I is a visual representation of Table V.

Figure I - Number of correct responses by students in Group A. (Verbal)



T-tests for paired samples : Group A

Paired samples t-tests were used to compare the pre-test and post-test results within Group A to determine if the results showed a significant difference between the scores. The significance level of .05 was used, consistent with usual practice for t-test calculations. Time one is used to describe the pre-test with time two being the post-test. The mean and standard deviation for both the pre-test and post-test is also given in Table VI.

Table VI - T-tests for paired samples. Group A.(Verbal)

Variable	No. of pairs	Corr	2-tail Sig	Mean	SD	SE of Mean
TIME ONE	21	.762	.000	4.7619	2.047	.447
TIME TWO				6.9524	2.109	.460

Paired Differences					
Mean	SD	SE of Mean	t-value	df	2-tailed Sig
- 2.1905	1.436	.313	- 6.99	20	.000

$p \leq .05$

The results clearly indicate a significant difference in the pre-test and post-test scores of the 'verbal' group. The implications and significance of these results are discussed more fully in Chapter Seven.

Gross-motor Rhythm Imitation Training Results

Table VII records the number of correct responses by students in the Gross-motor Rhythm Imitation Training Group for each item in the pre-test and post-test. Raw scores and percentages have been recorded.

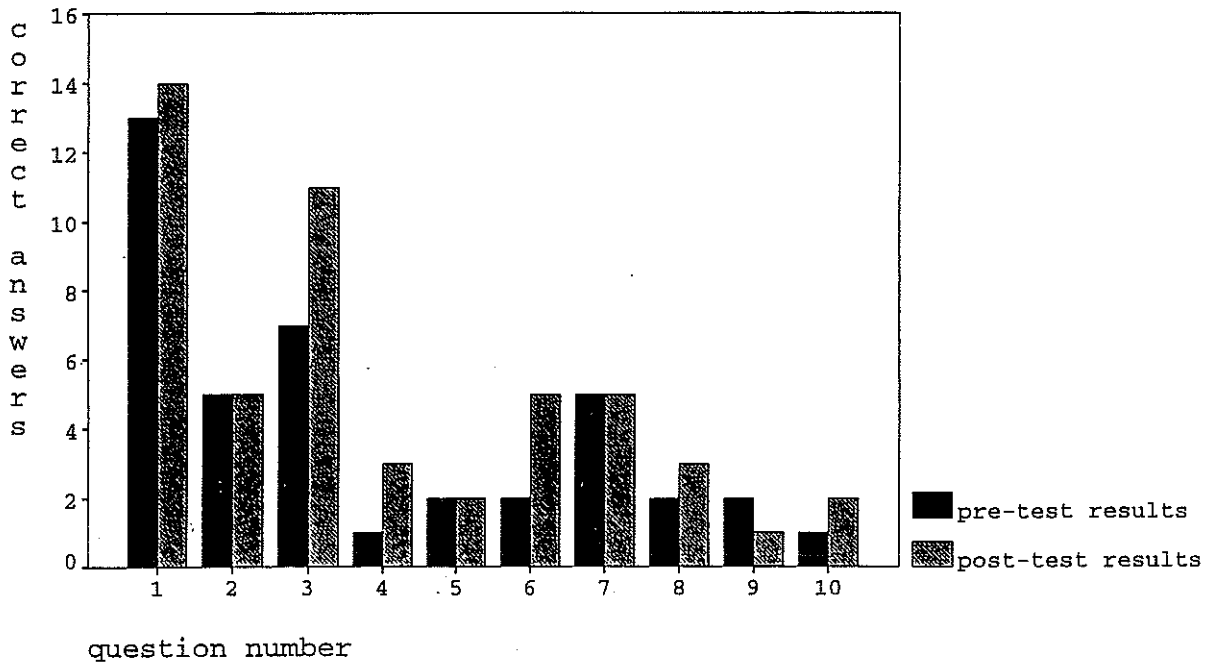
Table VII - Number of correct responses by students in Group B. (Gross-motor)

Item No.	*Pre-test score *n = 19*	*Percentage of responses correct*	*Post-test score *n = 19*	*Percentage of responses correct*
1	13	68 %	14	74 %
2	5	26 %	5	26 %
3	7	37 %	11	58 %
4	1	5 %	3	16 %
5	2	10.5 %	2	10.5 %
6	2	10.5 %	5	26 %
7	5	26 %	5	26 %
8	2	10.5 %	3	16 %
9	2	10.5 %	1	5 %
10	1	5 %	2	10.5 %

* *n = number of participants*

Figure II is a visual representation of Table VII.

Figure II - Number of correct responses by students in Group B. (Gross-motor)



T-tests for paired samples : Group B

a similar procedure was adopted in interpreting the pre-test and post-test scores of Group B (gross-motor).

Table VIII T-tests for paired samples. Group B.(Gross-motor)

Variable	No. of pairs	Corr	2-tail Sig	Mean	SD	SE of Mean
TIME ONE				2.0526	1.900	.436
	19	.687	.001			
TIME TWO				2.6842	2.311	.530

Paired Differences					
Mean	SD	SE of Mean	t-value	df	2-tailed Sig
- .6316	1.707	.392	- 1.61	18	.124

$p \leq .05$

As the figures indicate, there is no significant difference in the results of the pre-test and post-test of the 'gross-motor' group. This is discussed more fully in Chapter Seven.

Analysis of Variance

In order to compare results for both within and between the groups, a three-way ANOVA with repeated measures on the factor 'time' was used. Table IX shows results of both the main effects and interactions.

Table IX- Analysis of Variance.

Source	SS	df	F	Sig of F
MAIN EFFECTS				
Training	250.64	1	34.96	.000
Gender	1.23	1	.17	.681
Time	40.22	1	31.66	.000
TWO-WAY INTERACTIONS				
Training by Time	12.19	1	9.60	.004
Gender by Time	.94	1	.74	.396
Training by Gender	28.17	1	3.93	.055
THREE WAY INTERACTION				
Training by Time by Gender	.12	1	.10	.758

$p \leq .05$

The results show a significant interaction between training and time. The implications and significance of these results will be discussed at length in Chapter Seven.

CHAPTER SEVEN

DISCUSSION OF RESULTS

The research questions of this study were:

1. Is there a significant improvement between the pre-test and post-test scores of students who engage in a Verbalised Rhythm Imitation Programme?

2. Is there a significant improvement between the pre-test and post-test scores of students who engage in a Gross Motor Rhythm Imitation Programme?

3. Is there a significant difference in test scores between students who engage in a Verbalised Rhythm Imitation Programme and students who engage in a Gross Motor Rhythm Imitation Programme?

4. Is there a significant difference in the test scores of males and females who engage in a Verbalised Rhythm Imitation Programme or a Gross Motor Rhythm Imitation Programme?

Discussion of results in Table V and Table VII

In Table V (Verbal, Group A) and Table VII (Gross-motor, Group B) the test items with the highest number of correct responses can be identified. Item one was handled best by all students in the pre-test and post-test. Because all students in Group A gave correct responses in the pre-test a ceiling effect occurred for that item. Therefore in the post-test no improvement could be shown for that group. In fact, this was the only item that showed a decrease in the number of correct responses as one student gave an incorrect response (see Appendix Seven, p. 67). Only 68% of students in Group B gave correct responses in the pre-test with 74% giving correct responses in the post-test. Clapping the response, therefore, appears more difficult for students than verbalising the response. These findings concur with those of Schleuter and Schleuter (1985), Rainbow (1981) and Frega (1979).

Item two also proved to be more difficult for Group B with only 26% of the students giving correct responses in the pre-test and post-test. In contrast, 76% of students in Group A gave correct responses for the pre-test and post-test. There was no change in the overall number of 'correct' student responses, for either group, between the pre-test and post-test. However, when comparing Table X with Table XI (see pp. 67-68) it is interesting to note that not all students giving correct responses in the pre-test were the same ones that gave correct responses in the post-test. This is also true of items five and nine for Group A and items one, three, four, five, seven, eight and nine for Group B. This may

indicate some problems with the test used. A possible explanation for the occurrence may be that the test was too difficult for the students in Group B making the results in the pre-test unreliable. Perhaps more work is needed to establish the validity of individual test items, i.e., that students consistently give correct or incorrect responses to items over a number of testing sessions without any form of treatment applied between tests.

Item six is the only item for which students, in both groups, who gave correct responses in the pre-test also gave correct responses in the post-test. This item also showed the largest increase in percentage of correct responses for GroupA and the second largest increase in percentage of correct responses for Group B. This item would therefore appear to be a highly consistent and valid item, worth investigating regarding its structure and construction in terms of the placement of crotchets, quavers and minims.

For Group A (Verbal), six of the ten test items showed an increase in the post-test scores of 29% or more. The size of the increase is best demonstrated in Figure I, which gives a visual representation of Table V. For Group B (Gross-motor), only three of the ten test items showed an increase in the post-test scores of 10% or more. Again, this is easily seen in Figure II (see page 40). It is obvious from these results that Group A made larger improvements between the pre-test and post-test scores than Group B.

Discussion of t-test results

Table VI and VIII record the results of t-tests performed to determine the significance of the increase in correct scores between the pre-test and post-test for Group A and Group B. For Group A (Verbal), the mean number of students who gave correct responses in the pre-test was 4 76 with the standard deviation of 2.05. The mean for the post-test was 6.95 with the standard deviation of 2.11. The results show that there was a significant difference between the pre-test and post-test scores at the .000 level. As the significance level set for the calculations was only .05, in line with usual practice, it is obvious that the results are highly significant. Therefore, there was a significant improvement at the .05 level between the pre-test and post-test scores of students engaged in the Verbalised Rhythm Imitation Training Programme.

For Group B (Gross-motor), the mean number of students who gave correct responses in the pre-test was 2.05 with the standard deviation of 1.90. The mean for the post-test was 2.68 with the standard deviation of 2.31. The results show that there was a difference between the pre-test and post-test scores at the .124 level. As the significance level set for the calculations was .05, the results are not at all significant. Therefore, there was no significant improvement between the pre-test and post-test scores of students engaged in the Gross Motor Rhythm Imitation Training Programme.

Discussion of Analysis of Variance Results

A three-way ANOVA was performed to determine if any significant interactions occurred. 'Training' was the term used to describe the two groups who were involved in the rhythm imitation training programmes, i.e., Group A (Verbal) or Group B (Gross-motor). The factor 'training' by itself showed a significant difference between Group A (Verbal) and Group B (Gross-motor) at the .000 level. The t-test results confirmed this and showed that the overall test results of students involved in the 'Verbalised Rhythm Imitation Training Programme' were better than the overall test results of the students involved in the 'Gross-motor Rhythm Imitation Training Programme'.

The factor 'time' also showed a significant difference between the overall scores for the pre-test and the overall scores for the post-test. Without looking at the t-test results, it would appear that both training programmes showed improved test results, however, the t-test results show that it was really the increase in post-test scores by Group A (Verbal) that boosted the overall results for both groups.

Gender, i.e., being male or female, made no difference to the results within and between groups. When looking at the interaction between 'Gender and Training', it is interesting to note that the significance of F is .055 which is very close to the .05 significance level set for the calculations. Perhaps this is an

area that needs more investigation in future research. Nonetheless, for the purposes of this study, there was no significant difference found in the test scores of males and females who engaged in either of the two rhythm training programmes.

The interaction between 'Training' and 'Time' was highly significant. In fact the significance level set for the calculation was .05 and the significance level of the interaction was .004. The observed power of the interaction was .853. This means that it is highly unlikely that the study found a significant interaction when in reality there was none. Again, it was necessary to look at the t-test results to clarify the implications of the interaction that occurred. The t-test results combined with the ANOVA results clearly showed that the 'Verbalised Rhythm Imitation Programme' improved students rhythm imitation skills while the 'Gross-motor Rhythm Imitation Programme' did not.

Limitations

The following limitations have been identified: The results from this study may not be widely generalizable as this was a small scale study and all the children came from a middle-class, white Australian background. In order to generalise the findings, a larger study involving more students from varying backgrounds would need to be conducted.

The eight-week training period may have limited the effectiveness of the training. This may have been particularly true of the students in Group B (Gross-motor), as a longer period of time may have allowed for greater muscle control to be developed.

Another limitation of the study was the researcher's inability to isolate this rhythmic imitation programme from other related strategies of rhythmic development. For example, although no formal music tuition took place, other activities that took place in the classroom, such as singing and movement, could not be controlled and may have affected the results.

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the main findings of the study and makes recommendations for teachers with regard to rhythm imitation training. Some suggestions are made for further research on the topic.

Study Findings and Conclusions

The results of this research show a significant difference in test scores between students engaged in a Verbalised Rhythm Imitation Training Programme and students engaged in a Gross-motor Rhythm Imitation Programme. This conclusion supports claims by Gardner (1971), Greenberg (1976), Rainbow and Owen (1979), Rainbow (1981) and Schleuter and Schleuter (1985) that verbalising rhythmic patterns is a more preferred and appropriate response for young children.

There was no significant improvement in scores between the pre-test and post-test for Group B (Gross-motor). This supports and concurs with the findings of Woolcock (1990). A significant difference was evident when comparing the pre-test and post-test scores of Group A (Verbal). The results support Vygotsky's theory regarding the zone of proximal development. This is in direct contrast to both Zimmerman (1971) and Shuter-Dyson and Gabriel (1981) who all concluded that rhythm tests are somewhat resistant to the effects of training.

Their conclusions, however, were only based on gross-motor responses and not on verbal responses. The ability to duplicate rhythms can therefore be improved through training. Thackray (1972, p. 71) stated that " the best single test of rhythmic ability is one in which the subject is asked to reproduce the rhythm of a melody . . . either vocally or in some other medium which showed duration as well as timing and accentuation". Perhaps rhythmic ability as a whole, is best improved by verbal rhythm imitation training. Unlike Stambak's (1951) and Gardner's (1971) study, the results of this research suggest that children aged four to six years, are able to imitate rhythm patterns with up to eleven 'blows', so long as 'blows' are replaced with verbal sounds like 'tun'.

While gender did not appear to be a significant factor in the findings of this study, it may be a factor to consider in future studies as the results were very close to the significance level set for the study. Although it is possible that 'gender' does play a role in the success of rhythm imitation training, the small number of participants in this study may have skewed the results and so, possibly no such significance actually exists.

From the researcher's observations, female students appeared to concentrate more and tended to be more involved with the task on hand than the male students. Perhaps this is a more likely explanation for the increase in scores of the female students over those of the male students (see Appendices Seven and Eight, pp. 67-70). A study involving a larger number of students would be required before any definitive conclusions could be made.

Recommendations for Teachers

Based upon the findings of this study, the following recommendations are offered:

1. Music teachers should be aware of the importance of developing both rhythmic and melodic skills in pre-primary aged children. Colwell (1992, p.ix) stated " probably in no other field is early and consistent instruction so important". In particular, the value of imitation and rote learning in the acquisition of basic skills needs to be considered.

2. Both music teachers and pre-primary teachers need to be aware of the more appropriate methods of rhythm training for pre-primary aged children. While some teachers may still wish to use gross-motor responses for rhythm imitation, it is important that the value of verbalisation as an appropriate and preferred response should also be considered.

3. Teachers of pre-primary children should incorporate a systematic and sequentially developed Verbalised Rhythm Imitation Training Programme into their own daily programmes in order to optimise the potential benefits of such a training programme. Furthermore, regular rather than infrequent sessions, are most likely to yield greater improvement in rhythm imitation skills.

Recommendations for Further Research

The findings of this study indicate that there is much to be gained from further investigations into the topic. There are at least four areas which are suggested by the outcomes and the limitations of this study.

The first would be to extend the sample size to include a larger number of school and students. This would ensure a wider spread of abilities and socio-economic backgrounds of the students concerned. As the sample would be larger, 'gender' differences, if they existed, could be more noticeable. It may also be profitable to study the characteristics of children with superior rhythm imitation skills in order to determine whether memory, intelligence or other abilities in anyway correlate with such skills.

The second area of related research would be to determine whether longer exposure to the training programme would yield greater improvements. The present study was limited to an eight week training period. Perhaps over a longer period, gross-motor responses would show improvements also.

This suggests a third line of research that could be explored. In the study reported in this paper, students participated regularly in the training programme. It would be interesting to see whether the improvement in skills was a permanent improvement or whether without regular training sessions the ability to imitate rhythm patterns deteriorates. Perhaps a certain amount of training is required to permanently improve students' skills in this area.

A possible fourth area of research would require a longitudinal study to determine the value of rhythm imitation training in young children. To quote Thackray (1972, p. 72), " a rhythmic exercise which is done as an end in itself and not developed musically . . . would seem to be of limited value". A further examination of the place of rhythmic abilities in music education may answer the many questions unanswered by this study. Do students involved in a long term rhythm imitation programme have increased music skills overall? Are they able to transfer such skills to playing an instrument? Are they able to manage rhythm patterns which are significantly more difficult than their peers are able to manage? Maturation plays an important part in the development of gross-motor skills. Are students who initially verbalise rhythm patterns, able to imitate more

complex patterns by clapping as they mature and develop greater muscle control than students who are exposed only to gross-motor rhythm imitation?

Finally, there is a great need for more detailed research in the area of verbalised rhythm imitation training and the inherent value of such training. Much of the research work in this area at present is descriptive in nature and while providing useful information for further improvement in music education, more experimentally based research is needed. To quote Mark (1992, p. 58), "a major reason for research having relatively little influence on practice in music education is that few researchers have carried on sustained research programs on a single topic that are sufficiently evolutionary and developmental to justify the transition from theory to practice".

REFERENCES

Ashley, J. (1986). The influence of early formal music training on the music aptitude of young children: an evaluation of levels I and II of the Yamaha junior music course. Unpublished masters dissertation, Murdoch University, Perth, Western Australia.

Campbell, P. (1991). Rhythmic movement and public school music education: conservative and progressive views of the formative years. Journal of Research in Music Education, 33 (1), 12-22.

Colley, B. (1987). A comparison of syllabic methods for improving rhythm literacy. Journal of Research in Music Education, 35 (4), 221-23.

Colwell, R. (Ed.) Handbook of Research on Music Teaching and Learning. New York: Schirmer.

Costanza, P., & Russell, T. (1992). Methodologies in music education. In R. Colwell (Ed.) Handbook of Research on Music Teaching and Learning. (pp. 498-508). New York: Schirmer.

Davidson, L., & Colley, B. (1987). Children's rhythmic development from age 5 to 7: Performance, notation, and reading of rhythmic patterns. In J.C. Peery, I.W. Peery & T.W. Draper (Eds.) Music and Child Development (pp. 107-137). New York: Springer-Verlag.

Foley, E. (1975). Effects of training in conservation of tonal and rhythmic patterns of Grade Two children. Journal of Research in Music Education, 23 (4), 240-248.

Frega, A. (1979). Rhythmic tasks with 3,4 and 5 year old children - a study made in the Argentinian Republic. Bulletin for the Council of Research in Music Education, 59, 121-128.

Gardner, H. (1971). Children's duplication of rhythmic patterns. Journal of Research in Music Education, 19, 355-359.

Gordon, E. (1993). Learning Sequences in Music. Chicago: GIA Publications.

Greenberg, M. (1976). Research in music in early childhood education: a survey with recommendations. Bulletin of the Council for Research in Music Education, 45, 1-20.

Hargreaves, D.J. (1986). The Developmental Psychology of Music. Cambridge: Cambridge University Press.

Hedden, S.K. & Woods, D.G. (1992). Student outcomes of teaching systems for general music, grades K- 8. Handbook of Research on Music Teaching and Learning. 669-675. New York: Schirmer.

Mark, M.L. (1992). A history of music education research. Handbook of Research on Music Teaching and Learning. 48-59. New York: Schirmer.

Kuhn, T.L. & Gates, E. (1975). Effect of notational values, age and example length on tempo performance accuracy. Journal of Research in Music Education, 23, (3), 203-210.

Miller, L.B. (1987). Children's musical behaviours in the natural environment. In J.C. Peery, I.W. Peery & T.W. Draper (Eds.) Music and Child Development. (pp. 107 - 137). New York: Springer-Verlag.

Pascoe, B. (1995). The influence of primary school music programmes on student choice in lower secondary school. Unpublished masters dissertation, Edith Cowan University, Perth, Western Australia.

Peery, J.C., Peery, I.W., & Draper, T.W. (Eds.) Music and Child Development. New York: Springer-Verlag.

Piaget, J. (1970). The Science of Education and the Psychology of the Child. New York: Orion Press.

Pierce, M. (1992). The effects of learning procedure, tempo, and performance condition on transfer of rhythm skills in instrumental music. Journal of Research in Music Education, 4, 295-315.

Pflederer, M. (1964). The responses of children to musical tasks embodying Piaget's principle of conservation. Journal of Research in Music Education, 12, 215-268.

Rainbow, E.L. (1981). A final report on a 3-year investigation of a longitudinal study of rhythmic capability of pre-school children. Bulletin of the Council for Research in Music Education, 66, 69-70.

Rainbow, E.L. & Owen, D. (1979). A progress report on a three year investigation of the rhythmic ability of pre-school aged children. Bulletin for the Council of Research in Music Education, 59, 84-86.

Schleuter, S. & Schleuter, L. (1985). The relationship of grade level and sex differences to certain rhythmic responses of primary grade children. Journal of Research into Music Education, 33 (1), 23-30.

Scott-Kassner, C. (1992). Research on music in early childhood. Handbook of Research on Music Teaching and Learning. 633-650. New York: Schirmer.

Thackray, R. (1972). Rhythmic abilities in children. Music Education Research Papers No5, Novello and Company Ltd: London.

Thackray, R. (1969). An investigation into rhythmic abilities. Music Education Research Papers No 4, Novello and Company Ltd: London.

Vygotsky, L. (1986). Thought and Language (2nd rev.ed.) (A. Kozulin, Ed.). Massachusetts: The MIT Press.

Wall, J. & Murray, N. (1990). Children and Movement. Iowa: Wm. C. Brown Publishers

Woolcock, P. (1990). An empirical study of the effectiveness of training in developing pitch discrimination and rhythm performance skills in five and six-year-old children. Unpublished masters dissertation, University of Canberra, Canberra.

Zimmerman, M.P. (1971). Musical Characteristics of Children. Virginia: MENC.

APPENDIX ONE

Rhythm Imitation Test - Main Study

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10. 

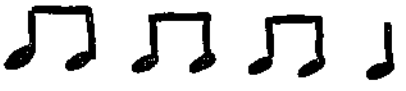
APPENDIX TWO

Rhythm Imitation Test - Pilot Study

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

APPENDIX THREE

WOOLCOCK RHYTHM PERFORMANCE TEST (1990)

Items

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

APPENDIX FOUR

Letter of Parental Consent

Dear Parent,

I am Liane Molewyk, a Music Specialist currently employed by the Education Department. As part of the requirements of the B.Ed (Hons). I intend to conduct a study of rhythm imitation training with pre-primary children.

For this project, your child's teacher, Mrs Kaberry, hopes to include training in rhythm for only 5 minutes in her daily programme during term 1, 1997. Ten rhythms will be heard daily and the children will be asked to imitate what they hear. Two different methods of imitation will be used and a comparison of the effectiveness of each will be made. I hope to find out which method of training should be used by music educators to increase rhythm imitation ability in young children. I would like permission for your child to participate in this study.

I will be conducting a simple rhythm test, consisting of ten simple rhythms to be imitated by the child, both before and after the training period to determine the effectiveness of the programme. I wish to record the test responses to allow time after the test to accurately analyse the results. In order to ensure anonymity and confidentiality, I will not publish the names of the children participating in this study.

Any questions concerning the project can be directed to Liane Molewyk on 479 7512.

Thank-you for your co-operation,

Mrs L.J.Molewyk, B.A.(Ed)

Please return the slip below to Mrs Kaberry

I have read the information above and any questions Ihave asked have been answered to my satisfaction. I give permission for my child to participate in this activity, realising I may withdraw my child at any time. I agree that the research data gathered for this study may be published provided my child is not identifiable.

Name of child Parent/Guardian Date

Investigator Date

APPENDIX FIVE

Transcript of Instructions on Audio Cassette for the Main Study Rhythm Imitation Test

For this exercise, you will be asked to listen to some rhythm patterns being *said/clapped. Then you will be asked to copy them or to say/clap them back to me. Remember to wait until you have heard the whole rhythm pattern before you repeat it. Let's have a practice.

My turn first. Tun, tun, tun 

Let's try one more. Tun, tun, tun, tun. 

Well done! Remember to wait for the end of the rhythm pattern before you repeat it. There are ten examples for you to listen to and copy.

Here we go: number one...

* The Verbal Rhythm Imitation Test used the word said, while the Gross-motor Rhythm Imitation Test used the word clapped.

APPENDIX SIX

Rhythm Imitation Training Programme

Days 1, 9, 17, 25

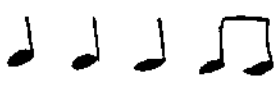
1. 
2. 
3. 
4.
5.
6.
7.
8.
9. 
10. 

Days 2, 10, 18, 26

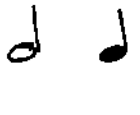
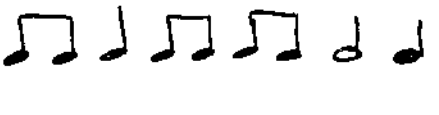
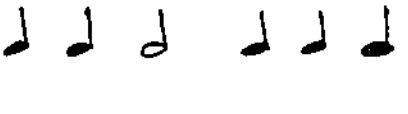
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Rhythm Imitation Training Programme

Days 3, 11, 19, 27.

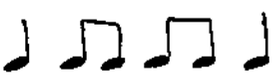
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Days 4, 12, 20, 28

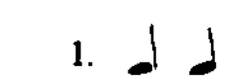
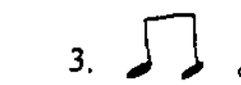
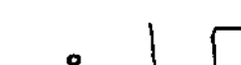
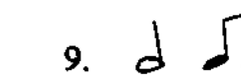
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Rhythm Imitation Training Programme

Days 5, 13, 21, 29.

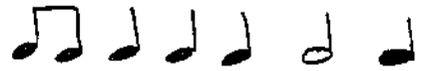
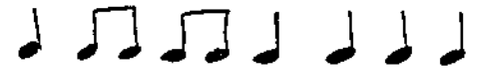
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Days 6, 14, 22, 30

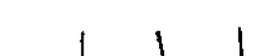
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Rhythm Imitation Training Programme

Days 7, 15, 23, 31.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Days 8, 16, 24, 32.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

APPENDIX SEVEN

Tables of Pre-test and Post-test results of Group A (Verbal)

Table X shows the pre-test results of each student. Item numbers are given across the top of the table. The individual srudent number is indicated in the left column followed by the gender, F for female and M for male, of the student. Correct answers are indicated by the letter Y while incorrect answers are indicated by the letter O. Across the bottom of the table is the total number of correct answers.

Table X - Pre-test results of individuals in Group A. (Verbal), n 21*

Item No.1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total Correct*
Student										
1 F	*Y*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*O*	*7*
2 F	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*O*	*Y*	*O*	*Y*	*6*
3 F	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*7*
4 F	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*O*	*Y*	*Y*	*7*
5 F	*Y*	*Y*	*O*	*O*	*Y*	*O*	*Y*	*O*	*O*	*Y*	*5*
6 F	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*Y*	*3*
7 F	*Y*	*Y*	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*4*
8 F	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*2*
9 F	*Y*	*Y*	*Y*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*4*
10 F	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*O*	*O*	*Y*	*Y*	*6*
11 M	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*7*
12 M	*Y*	*Y*	*O*	*O*	*Y*	*O*	*Y*	*O*	*O*	*O*	*4*
13 M	*Y*	*O*	*O*	*O*	*Y*	*O*	*Y*	*O*	*O*	*O*	*3*
14 M	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*2*
15 M	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*O*	*5*
16 M	*Y*	*Y*	*Y*	*O*	*O*	*O*	*Y*	*O*	*Y*	*O*	*5*
17 M	*Y*	*Y*	*Y*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*4*
18 M	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*Y*	*Y*	*9*
19 M	*Y*	*Y*	*O*	*O*	*Y*	*O*	*Y*	*O*	*Y*	*Y*	*6*
20 M	*Y*	*Y*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*3*
21 M	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
Total	*21*	*16*	*11*	*2*	*7*	*7*	*16*	*3*	*8*	*9*	

* *n = number of participants*

Table XI shows the post-test results of each student. As for Table X, item numbers are given across the top of the table with the individual student number indicated in the left column. Correct answers are indicated by the letter Y while incorrect answers are indicated by the letter O. Across the bottom of the table is the total number of correct answers.

*Table XI - Post-test results of individuals in Group A. (Verbal), *n 21*

Item No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total Correct*
Student											
1	*F*	*Y*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*O*	*Y*	*8*
2	*F*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*Y*	*Y*	*9*
3	*F*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*8*
4	*F*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*10*
5	*F*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*O*	*Y*	*8*
6	*F*	*Y*	*Y*	*O*	*O*	*O*	*Y*	*Y*	*O*	*O*	*Y*	*5*
7	*F*	*Y*	*Y*	*Y*	*O*	*Y*	*O*	*Y*	*O*	*Y*	*Y*	*7*
8	*F*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*Y*	*Y*	*8*
9	*F*	*Y*	*O*	*Y*	*O*	*O*	*Y*	*Y*	*O*	*O*	*O*	*4*
10	*F*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*9*
11	*M*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*9*
12	*M*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*Y*	*Y*	*8*
13	*M*	*Y*	*O*	*O*	*O*	*O*	*Y*	*Y*	*O*	*Y*	*O*	*4*
14	*M*	*Y*	*O*	*Y*	*O*	*O*	*Y*	*Y*	*O*	*Y*	*O*	*5*
15	*M*	*Y*	*O*	*Y*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*6*
16	*M*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*8*
17	*M*	*Y*	*Y*	*O*	*Y*	*O*	*O*	*Y*	*Y*	*O*	*Y*	*6*
18	*M*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*10*
19	*M*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*7*
20	*M*	*O*	*Y*	*O*	*O*	*O*	*O*	*Y*	*O*	*Y*	*O*	*3*
21	*M*	*Y*	*O*	*Y*	*O*	*O*	*O*	*Y*	*O*	*Y*	*O*	*4*
Total		*20*	*16*	*17*	*8*	*10*	*16*	*20*	*9*	*14*	*16*	

** n = number of participants*

APPENDIX EIGHT

Tables of Pre-test and Post-test results of Group B (Gross-motor)

Table XII shows the pre-test results of each student in Group B. Item numbers are given across the top of the table. The individual srudent number is indicated in the left column followed by the gender, F for female and M for male, of the student. Correct answers are indicated by the letter Y while incorrect answers are indicated by the letter O. Across the bottom of the table is the total number of correct answers.

*Table XII - Pre-test results of individuals in Group B. (Gross-motor), *n= 19*

Item No.1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total Correct*
Student										
1 F	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
2 F	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
3 F	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
4 F	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
5 F	*Y*	*Y*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*3*
6 F	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
7 F	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*2*
8 F	*Y*	*Y*	*Y*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*4*
9 F	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
10 M	*Y*	*O*	*Y*	*O*	*O*	*O*	*Y*	*O*	*O*	*O*	*3*
11 M	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
12 M	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
13 M	*Y*	*Y*	*Y*	*O*	*O*	*O*	*O*	*Y*	*O*	*O*	*4*
14 M	*Y*	*O*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*3*
15 M	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*Y*	*O*	*3*
16 M	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*O*	*Y*	*Y*	*7*
17 M	*Y*	*Y*	*O*	*O*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*5*
18 M	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
19 M	*Y*	*O*	*O*	*O*	*Y*	*O*	*Y*	*O*	*O*	*O*	*3*
Total	*13*	*5*	*7*	*1*	*2*	*2*	*5*	*2*	*2*	*1*	

** n = number of participants*

Table XIII shows the post-test results of each student in Group B. Item numbers are given across the top of the table with the individual student number in the left hand column. Correct answers are indicated by the letter Y while incorrect answers are indicated by the letter O. Across the bottom of the table is the total number of correct answers.

*Table XIII - Post-test results of individuals in Group B. (Gross-motor), *n 19*

Item No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total Correct*
Student											
1	*F*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*2*
2	*F*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
3	*F*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
4	*F*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*2*
5	*F*	*Y*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*O*	*O*	*5*
6	*F*	*O*	*Y*	*Y*	*Y*	*O*	*Y*	*O*	*O*	*O*	*4*
7	*F*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
8	*F*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
9	*F*	*O*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*1*
10	*M*	*O*	*O*	*Y*	*O*	*O*	*O*	*O*	*Y*	*O*	*2*
11	*M*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*2*
12	*M*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
13	*M*	*Y*	*Y*	*Y*	*Y*	*O*	*O*	*Y*	*O*	*O*	*5*
14	*M*	*Y*	*O*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*3*
15	*M*	*Y*	*O*	*Y*	*O*	*O*	*O*	*O*	*O*	*O*	*2*
16	*M*	*Y*	*Y*	*Y*	*Y*	*O*	*Y*	*Y*	*Y*	*Y*	*9*
17	*M*	*Y*	*Y*	*O*	*O*	*O*	*Y*	*Y*	*O*	*O*	*4*
18	*M*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*O*	*0*
19	*M*	*Y*	*O*	*Y*	*O*	*O*	*Y*	*Y*	*Y*	*O*	*Y*	*6*
Total		*14*	*5*	*11*	*3*	*2*	*5*	*5*	*3*	*1*	*2*	

** n = number of participants*